CLAIMS

What is claimed is:

1. A direct conversion quadrature receiver, comprising:

a primary local oscillator (LO) that down-converts a received RF signal to a quadrature intermediate frequency (IF) signal; and

a dithering controller responsive to said quadrature IF signal generated by said primary LO for communicating a feedback signal back to said primary LO, said feedback signal controlling an oscillation frequency of said primary LO;

wherein said dithering controller offsets down-conversion of said RF signal by said primary LO from a zero-IF in order to reduce a phase and gain error of said quadrature IF signal.

2. The receiver of claim 1, further comprising a phase and gain error measurement apparatus that measures a phase and gain error of said quadrature IF signal and generates a phase and gain error signal, wherein said dithering controller offsets said primary LO based on said phase and gain error signal.

3. The receiver of claim 1, wherein said dithering controller controls said primary LO to step said quadrature IF signal in response to said phase and gain error signal.

4. The receiver of claim 1, further comprising a memory storing a predetermined step size that steps said primary LO away from a current quadrature IF signal and a predetermined step limit that limits a stepping of said primary LO to a predetermined frequency range.

5. The receiver of claim 1, wherein said dithering controller controls said primary LO to dither said quadrature IF signal according to a predetermined hop sequence.

6. The receiver of claim 1, further comprising a memory storing a predetermined hop sequence that dithers said primary LO over a plurality of hop frequencies.

7. The receiver of claim 1, further comprising:

a filter bank comprising one or more I signal component filters and one or more Q signal component filters, said filter bank generates a plurality of frequency spectra from said quadrature IF signal;

an interferer level detector that measures each frequency spectra of said plurality of frequency spectra;

a frequency discriminator that generates a frequency number for each spectra output from said filter bank;

a level/frequency threshold including a predetermined power threshold that compares a signal power of each frequency spectra to said predetermined power threshold;

wherein said level/frequency threshold provides a step-required output to said LO dithering controller if a frequency spectra of said plurality of frequency spectra exceeds said predetermined power threshold.

8. The receiver of claim 1, further comprising:

a phase and gain error limit threshold that compares a current phase and gain error to a previous phase and gain error, generates a phase and gain error difference, and generates a step-required output to said LO dithering controller if said phase and gain error difference exceeds a predetermined phase and gain error limit threshold.

9. A method of offsetting a primary LO in a direct conversion quadrature receiver, comprising the steps of:

generating a quadrature intermediate frequency (IF) signal; and

offsetting said primary LO from a zero-IF signal to produce an offset quadrature IF signal.

10. The method of claim 9, further comprising the step of measuring a phase and gain error in said offset quadrature IF signal, with said measuring producing a phase and gain error signal based on said phase and gain error signal.

11. The method of claim 9, wherein said offsetting comprises stepping said primary LO by a predetermined frequency step to produce an IF that is offset from zero Hertz.

12. The method of claim 9, wherein said offsetting comprises dithering said primary LO over a plurality of hop frequencies in a predetermined hop sequence.

13. The method of claim 9, wherein the method further comprises the steps of:

dithering said primary LO over a plurality of hop frequencies in a predetermined hop sequence;

measuring a phase and gain error in said quadrature IF signal for each hop frequency of said plurality of hop frequencies to create a plurality of phase and gain errors;

finding an outlier phase and gain error in said plurality of phase and gain errors; and

removing said outlier phase and gain error from said phase and gain error average.

14. The method of claim 13, further comprising removing from said hop sequence a hop frequency that generated said outlier phase and gain error.

15. The method of claim 13, wherein said measuring, finding, and removing steps are iteratively performed.

16. The method of claim 13, wherein the step of finding an outlier phase and gain error further comprises the steps of:

averaging the plurality of phase and gain errors to produce a phase and gain error average;

finding a distance of each phase and gain error from said phase and gain error average; and

determining said outlier phase and gain error to be a phase and gain error that is a greatest distance from said phase and gain error average.

17. The method of claim 13, wherein the finding step further comprises the steps of:

comparing each phase and gain error of said plurality of phase and gain errors to a predetermined outlier threshold; and

determining said outlier phase and gain error to be a phase and gain error that most exceeds said predetermined outlier threshold.

18. The method of claim 13, wherein the finding step further comprises the steps of:

comparing each phase and gain error of said plurality of phase and gain errors to a predetermined outlier threshold; and

determining said outlier phase and gain error to be any phase and gain error that exceeds said predetermined outlier threshold;

wherein the determining step is capable of determining more than one outlier.

19. The method of claim 9, further comprising the steps of:

creating a plurality of quadrature IF frequency spectra; and

comparing a frequency spectra of said plurality of quadrature IF frequency spectra to a predetermined power threshold;

wherein the offsetting step is performed if said frequency spectra exceeds said predetermined power threshold.

20. The method of claim 9, further comprising the steps of:

measuring a phase and gain error in said quadrature IF signal;

creating a difference value of a difference between said phase and gain error and a previous phase and gain error; and

comparing said difference value to a predetermined phase and gain error limit threshold;

wherein the offsetting step is performed if said difference value exceeds said predetermined phase and gain error limit threshold.